Galactic Archaeology on a grand scale

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MOTIVATION: Unravelling the evolutionary history of the Milky Way has been a longstanding problem in contemporary astrophysics, and solving this will have significant ramifications for our understanding of how other galaxies form and evolve. Success will depend on understanding the stars within our Galaxy: their role as its building blocks and the driver of its chemical evolution. This demands precise measurements of the fundamental properties of stars, something we have currently achieved mainly for the solar neighbourhood. Initial investigations in this new field of near-field cosmology better known as Galactic Archaeology has used Kepler and CoRoT data and shown that asteroseismically-determined radii, masses and ages of red giants have tremendous potential for expanding our view into how the Galaxy formed and evolved.

RELEVANCE: It is now clear that a lack of simple and easily reproducible selection criteria for the previous Kepler and CoRoT stellar samples hampers our ability to faithfully compare theoretical models with observations. A dedicated Galactic Archaeology program for K2 will avoid such limitations and in addition provides information on the Galactic morphology in directions complementary to those already probed by CoRoT and Kepler.

AIM: The proposal aims to observe a sizable number of colour-magnitude selected red giants (~5000 per campaign) to probe the Galaxy far beyond the solar neighbourhood. This is a continuing program initiated during C1, and it is our intention to make similar proposals for all future K2 fields in order to probe Galactic directions not probed before, taking advantage of K2s 360-degree view along the ecliptic. With this data we aim to build a comprehensive picture of the Galaxys structure and evolution from its stellar populations.

METHOLOGY: The K2 data will be used to determine radius, mass, and age of each star using asteroseismology, complemented by ground-based spectroscopy from large surveys targeting both hemispheres (APOGEE, GALAH, Gaia-ESO, and RAVE). We will use our seismic inferred stellar properties to stress-test state-of-the-art Galaxy models (Galaxia, TRILEGAL).